12. CONCLUSIONS

The determination of the Stress Concentration Factor is really important when designing. Using adequately this factor can be crucial to determine the service life of an element and the security of the operator. The problem of using K_t is that it is specific for one arrangement and shape; because of this it is difficult to know the value of all of them. If the value of K_t is known, it can give the designer a good idea of how the stress distributions are going to be, and that way any necessary changes to de design can be made. If the value is not known, the easiest way to find it is by the Finite Element Method. Analyses will have to be developed for its specific arrangement, and then the behavior of it will be known. An advantage of this method is that the stress distribution can be seen, and this allows identifying the weak points of the design.

The arrangements presented in here are only one part of the many arrangements that can exist. The advantage of finding the Stress Concentration Factor by the Finite Element Method is that the stress distribution can be seen, and that way it allows checking if the behavior of it is as expected. Another important thing is that not only a Chart is obtained, but also an equation which approximately describes the behavior of the element. So instead of having only one method of figuring out Kt, the designer will have two. Every designer can use the one that fits its needs better: a mathematical method or a graphical method. They are not going to give the same value, but it is going to be approximately the same.

As said before, each arrangement needs its own K_t Chart, but maybe by watching what happens when changing a parameter can give a close idea to how the element is going to behave if the same pattern is followed. For example, in this case, for the first

three analyses, when increasing the radius of the complementary notches, the Stress Concentration also increased. So maybe if an analysis with complementary notches radiuses of 4 mm would have been done, the line L/r would be higher in the Chart, meaning that the stress concentrations are higher and so K_t. And the same thing happens with the last three analyses. As the radius of the complementary notches increased, the stress concentrations decreased.

Algor plays an important role in the Computer Aided Finite Element Analysis, because it gives accurate results without performing any physical tests. The advantage of this is that the time of investigation is reduced, as well as the costs caused by this and the time. The results are trustable, and the designer can ask for the value of stresses at specific points. By doing this, he has the capability of changing any parameter to see how it affects the whole element or even an assembly. The most effective stress concentrator is going to be that which reduces the Stress Concentration Factor the most, and also which manufacturability is easier.

For the analyses performed here, the most effective stress concentrator is that of the seventh analysis. These complementary notches reduced the value of Kt in approximately 43%, which represents a reduction of nearly half the original value. It can also be concluded that the last three analyses gave a lower Stress Concentration Factor because they are closer to the central notch, which allows having a more direct effect on it and therefore diminishing more the value of it.